Fact Sheet 2. Understanding measures of income and wealth

Economic and social analysts and policy makers are interested in the distribution of resources and how this affects the well-being of society and individuals, particularly people's ability to acquire the goods and services required to satisfy their needs.

Questions that researchers ask include:

- How unequal is the distribution of income and wealth? How does this compare with earlier years, or with other countries?
- What are the characteristics of households considered most at risk of economic hardship? Which are in greatest need of financial support?
- Do people have sufficient incomes and wealth accumulation in their working lives and to maintain an adequate standard of living in retirement?

Equivalence scales

Why is an equivalence scale used?

As household size increases, consumption needs also increase but there are economies of scale. An equivalence scale is used to adjust household incomes to take account of the economies that flow from sharing resources and enable more meaningful comparisons across different types of households.

For a lone person household equivalised income is equal to actual income. For households comprising more than one person, it is the estimated income that a lone person household would need to enjoy the same standard of living as the household in question.

How are equivalising factors calculated?
Equivalising factors are calculated based on the size and composition of the household, recognising that children typically have fewer needs than adults. The ABS uses the OECD-modified equivalence scale which assigns a value of 1 to the household head, 0.5 to each additional person 15 years or older and 0.3 to each child under 15 years.

Table 1 shows that a couple household with one child would need $1,800 weekly disposable income to have the same equivalised disposable household income (EDHI) as a lone person household with a disposable income of $1,000.

Table 1. Examples of equivalised weekly disposable household income

Household composition	Equivalising factor (x)	Disposable income (y)	Equivalised disposable (y/x)
	no.	$	$
Lone person	1	1,000	1,000
Couple only	(1 + 0.5) = 1.5	1,500	1,000
Couple with one child under 15 years	(1 + 0.5 + 0.3) = 1.8	1,800	1,000
Group household with three adults	(1 + 0.5 + 0.5) = 2.0	2,000	1,000

Relationship between equivalisation of income, consumption and wealth
Equivalence scales used for household income are equally applicable for consumption measures. There is less agreement about how to equivalise household wealth as wealth is often built up during a person's working life and then used during retirement when the composition of the household might be quite different. However, when wealth is being used to support current consumption, particularly for households at risk of economic hardship, household wealth should be equivalised with the same scale used to equivalise household income and

consumption.

Analysis of households and persons

There are two common ways of presenting analysis of households:

- number of households, or
- number of people in households.

In the former, each household contributes the same regardless of its size e.g. a four person household would have the same representation as a person living alone.

To provide a better understanding of the circumstances of people it is often preferable to study people in households e.g. the number of people in Australian households experiencing economic hardship. In this analysis, each person is attributed with the characteristics of the household to which they belong e.g. household income is used to determine whether it is a low or high income household but analysis is about numbers of people experiencing hardship. This approach keeps the focus on individual circumstances while recognising that people share household resources.

Summary measures

There are several summary measures commonly used for analysing household economic well-being.

Counts
Counts provide an estimate of the total number of people or households with a particular characteristic and are derived by summing the survey weights of each observation of interest. In sample surveys the weights enable extrapolation of the survey responses to official population estimates.

Means
The arithmetic mean, or average, is the sum of all income divided by the number of observations. Advantages of the mean are that it is easy to calculate and the means of all sub components sum to the mean of all observations. Its drawbacks are the effect of extreme values and asymmetry of the distribution, both of which are relevant for income and wealth data. For example, a small number of very wealthy and a large number of relatively poor households may have the same average income or wealth as a population where there is equal distribution of resources.

Medians
Medians are calculated by ranking all observations from the lowest to the highest. The middle observation of the distribution is the median. Compared to the mean, the median is a more stable measure and is less affected by extreme values and sample fluctuations. However, median values of sub components do not sum to the median of all observations.

Distribution measures

Measures of the distribution of income and wealth help to describe and understand how economic resources are shared across the population and households.

Frequency distribution
Frequency distributions show the proportion of people or households with a particular level of income or wealth. To produce the distribution, the item of interest is ranked by value and the population grouped into classes. The ABS currently uses $50 ranges for weekly income and $100,000 ranges for wealth.

It is useful to include the summary statistics such as the mean and median in the frequency distributions. Income and wealth distributions tend to be asymmetrical, with a small number of people having relatively high income or wealth and a much larger number having relatively low income or wealth (Graph 1).

Graph 1. Distribution of equivalised disposable household income, 2019–20

Source: ABS Survey of Income and Housing

Quantiles

Quantile is a term for groups formed by ranking the units of analysis (e.g. household or persons) in ascending order and calculating the shares of the total accruing to a given proportion of the units:

- quintiles are formed when the population is divided into five equally sized groups
- deciles into ten groups
- percentiles into 100 groups

Therefore the first quintile will comprise the first two deciles and the first 20 percentiles. The mean or the median may be used to summarise the circumstances within a quantile.

Graph 2. Equivalised household income, by quintile, 2019–20

Source: ABS Survey of Income and Housing

Percentile ratios

The boundary between quantiles is usually expressed as the upper value of a particular percentile. The ABS publishes the upper value of each decile (P10 to P90). This provides the range of values in each quintile e.g. the middle (3rd) quintile is formed by households with income/wealth between P40 and P60. The median of each quintile can also be determined e.g. the median of the first quintile is P10, second quintile, P30, etc. The median of the whole population is P50.

Percentile ratios summarise the relative distance between two points on the income or wealth distribution. Percentile ratios will be less volatile than measures based on means, particularly at each end of the distribution. To illustrate the full spread of the income distribution, the percentile ratio should use points near the extremes e.g. the P90/P10 ratio. The P80/P20 ratio better illustrates the magnitude of the range or the majority of the population. The P90/P50 and P10/P50 ratios compare the ends of the distribution with the median and these are commonly used to understand how the wealthier compare to average and the poorer to average.

Table 2 shows that income is more equally distributed than wealth. In 2019–20, the equivalised income of households at the top of the 80th percentile (or fourth quintile) was 2.6 times higher than that of households at the top of the 20th percentile (or lowest quintile), whereas wealth was 11 times higher (P80/P20).

Table 2. Ratio of values at top of selected percentiles, 2019–20

	Equivalised disposable household income	Equivalised net worth
P90/P10	4.00	52.32
P80/P20	2.60	11.14
P90/P50	1.98	3.97
P10/P50	0.50	0.07

Source: ABS Survey of Income and Housing

Shares of income or wealth

Income or wealth shares can be calculated and compared for each quantile of a population. The aggregate income/wealth of units in each quantile is divided by the total aggregate of the entire population to derive quantile share.

Graph 3 shows income and wealth shares by decile. Household wealth is more unequally distributed than household income. People in the three lowest equivalised income deciles received 13% of all income, whilst people in the three lowest equivalised wealth deciles held only 3% of all wealth in 2019–20.

Graph 3. Share of equivalised household income and net worth(a), 2019–20

a. Decile boundaries are derived separately for equivalised disposable income and net worth

Source: ABS Survey of Income and Housing

Gini coefficient
The Gini coefficient is a single statistical indicator of the degree of inequality. It equals zero when all people have the same level of income and equals one when one person receives all the income.
In general the smaller the Gini coefficient, the more equal the distribution of income or wealth. Any increase in the income of a person with income greater than the median will always lead to an increase in the Gini coefficient, while an increase in the income of a person with income lower than the median will always lead to a decrease in the coefficient.

A time series analysis of the Gini coefficient can be found in fact sheet 4.

Table 3. Gini coefficient, by household income and wealth, 2019–20

	Gini coefficient
Equivalised disposable household income	0.324
Equivalised net wealth	0.605

Source: ABS Survey of Income and Housing

Measurement Errors

Sampling Error
Household survey estimates are based on a sample of possible observations and are subject to sampling variability. The sampling error is a measure of the variability that occurs by chance because a sample, rather than the entire population, is surveyed. One measure of the likely difference is given by the standard error (SE). Another measure of the likely difference is the relative standard error (RSE), which is obtained by expressing the SE as a percentage of the estimate. The RSE is a useful measure in that it provides an immediate indication of the percentage errors likely to have occurred due to sampling, and thus avoids the need to refer also to the size of the estimate.

The ABS annotates estimates with a RSE between 25% and less than 50% by a preceding asterisk (e.g. *3.4) to indicate they are subject to high SEs and should be used with caution. Estimates with RSEs of 50% or more are preceded with a double asterisk (e.g. **0.6), indicating that these estimates are considered unreliable for most purposes.

Another measure of sampling error is the Margin of Error (MOE). This describes the distance from the population value that the sample estimate is likely to be within and is particularly useful to understand the accuracy of proportion estimates. It is specified at a given level of confidence. Confidence levels typically used are 90%, 95% and 99%.

The ABS calculates MOEs at the 95% confidence level. Proportion estimates with a MOE greater than 10% are annotated with a preceding hash sign (e.g. #3.4%) to indicate they have a high margin of error and should be used with caution.

Significance Testing

To compare estimates between surveys or between populations within a survey it is important to determine whether apparent differences are 'real' or simply the product of differences between the survey samples. A common approach is to determine whether the difference between the estimates is statistically significant by calculating the standard error of the difference between two estimates (x and y) and using that to calculate the test statistic using the formula below:

$$\frac{|x-y|}{SE(x-y)}$$

If the value is greater than 1.96 there is good evidence of a statistically significant difference at 95% confidence levels between the two populations for the characteristic being tested. Otherwise, it cannot be stated with confidence that there is a real difference between the populations.

For more information:

- United Nations, 2011, [Canberra Group Handbook on Household Income Statistics, Second Edition (https://unece.org/statistics/publications/canberra-group-handbook-household-income-statistics-2nd-edition)](https://unece.org/statistics/publications/canberra-group-handbook-household-income-statistics-2nd-edition), United Nations Economic Commission for Europe